

# FACT SHEET

## California Company Licenses KSC Standing Wave Reflectometer Technology



Eclipse International Corporation of Ontario, California is currently developing commercial Standing Wave Reflectometers (SWR's) based on a prototype design and patent by NASA at Kennedy Space Center, Florida.

NASA's reflectometer was developed to provide a reliable, portable instrument to verify the condition of electrical power and signal distribution systems inside the Space Shuttle orbiters. Exclusive patent rights have been granted to Eclipse International, a leading provider of Automatic Test Equipment (ATE) and associated test application software solutions for commercial and military organizations worldwide. The company is calling its new SWR product the ESP Model A, according to Eclipse Corporate Marketing Director Christopher Teal.

The use of this technology also may have a significant impact on the issue of aging wiring that the White House Office of Science & Technology Policy (OS&TP) has concluded is of national concern, and that extends beyond aviation. Teal pointed out that, as a result of a review of existing research and wire safety efforts underway by the Federal Aviation Administration (FAA), Department of Defense (DOD), and NASA, OS&TP has formed a Wire System Safety Interagency Working Group that will become the focal point for wire safety technology in the United States. The recent request for inputs by the OS&TP refers to this technology as "intelligent systems, such as standing wave reflectometry for identifying faults." Safety in our homes, businesses, and transportation is a high social priority and all are electric energy dependent.

Commercial SWR applications include all industries that generate, distribute, consume, or use electrical energy in, or to control processes, Teal explained. Economic benefits derived by the application of this technology include: 1) lower investment in

troubleshooting equipment, 2) reduced time and effort to repair, 3) reduced time to validate repair, and 4) enables proactive maintenance to avoid failure-induced downtime, all of which result in lower total operating cost.

All the Eclipse circuit analyzers are software controlled, user-programmable, and provide ease of expansion to analyze circuits consisting of 2 to 128,000 nodes in 128 node increments. The initial production, handheld, battery-powered test sets are scheduled for market entry in the last quarter of 2000, with a range of 1,000 feet and fault location accuracy of 0.2 percent. Other features include an alphanumeric display, keypad, rechargeable battery (8-hour operating time), power management (auto shut off), illuminated display and keypad, serial data port, drip/splash proof and shock resistant case, operating range in -20 to +60 degrees C, meets Federal Communications Commission (FCC) standards class B, with a simple menu-driven architecture and 10 programmable settings for various conductor types.

Longer range plans include the integration of the reflectometry technology with the Eclipse analyzer and switching matrix products to permit automatic test of large distribution systems rapidly, accurately, repeatable, and at low cost.

The SWR tester was developed at KSC to provide a reliable, portable instrument to verify the condition of cables inside the Space Shuttle orbiters. Using this technology, test personnel can find the precise location -- within a few centimeters -- of a short or an open circuit in a cable. Dr. Pedro Medelius of Dynacs, Inc., the KSC Engineering Development Contractor (EDC), developed the invention to help save man-hours during Shuttle processing. When troubleshooting a potential instrumentation problem, personnel frequently have to disconnect cables to verify that the cable is not the source of the problem. The cables are often multiwire bundles and difficult to access. Once a cable is disconnected, all systems that have a wire passing through the bundled connector must be retested when the cable is reconnected. This results in many hours of revalidation testing on systems that were unrelated to the original problem. NASA's Standing Wave Reflectometer allows cable continuity to be checked non-intrusively and the actual location of any fault to be found, saving many hours of testing on each Shuttle processing flow.

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